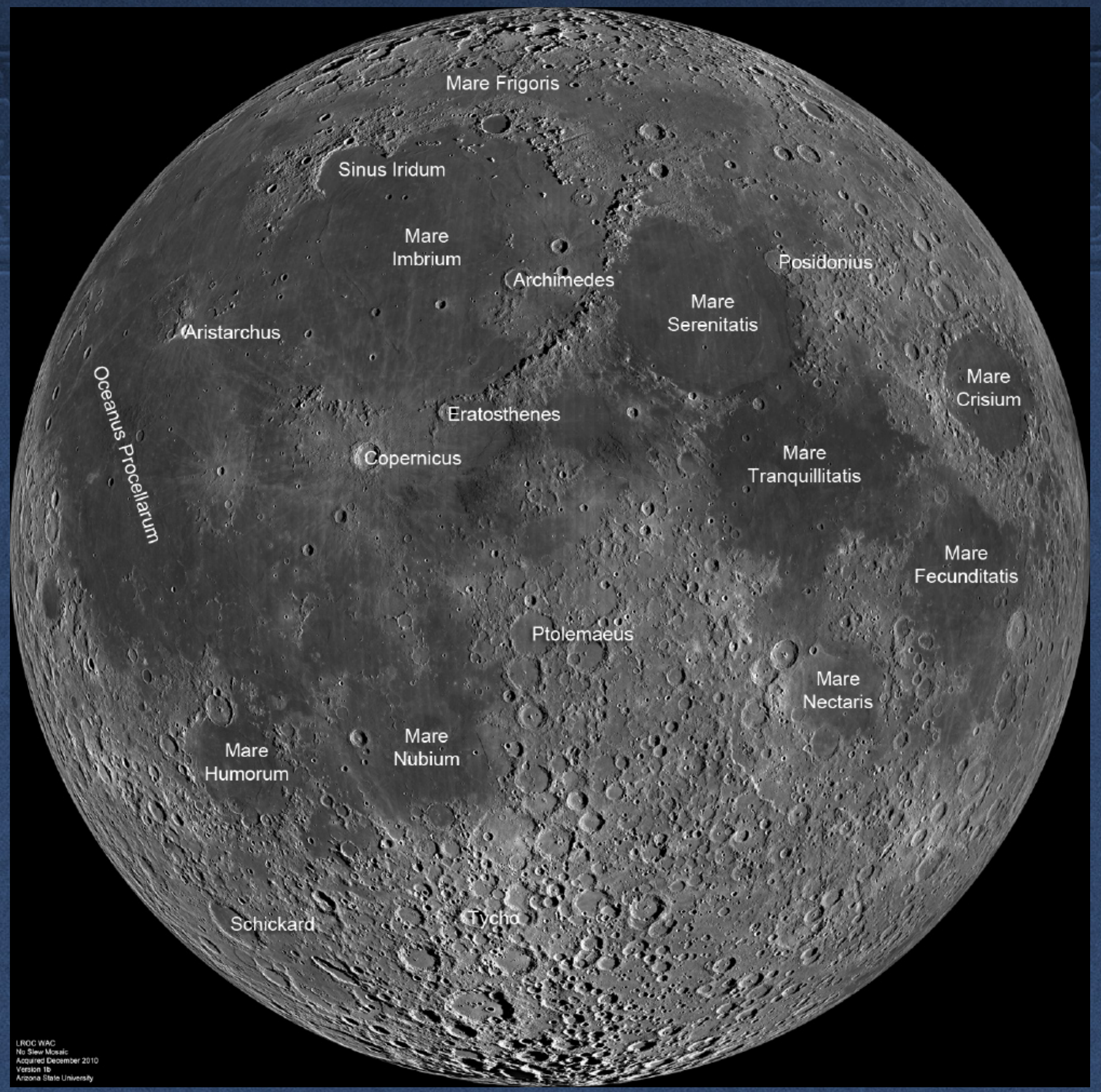
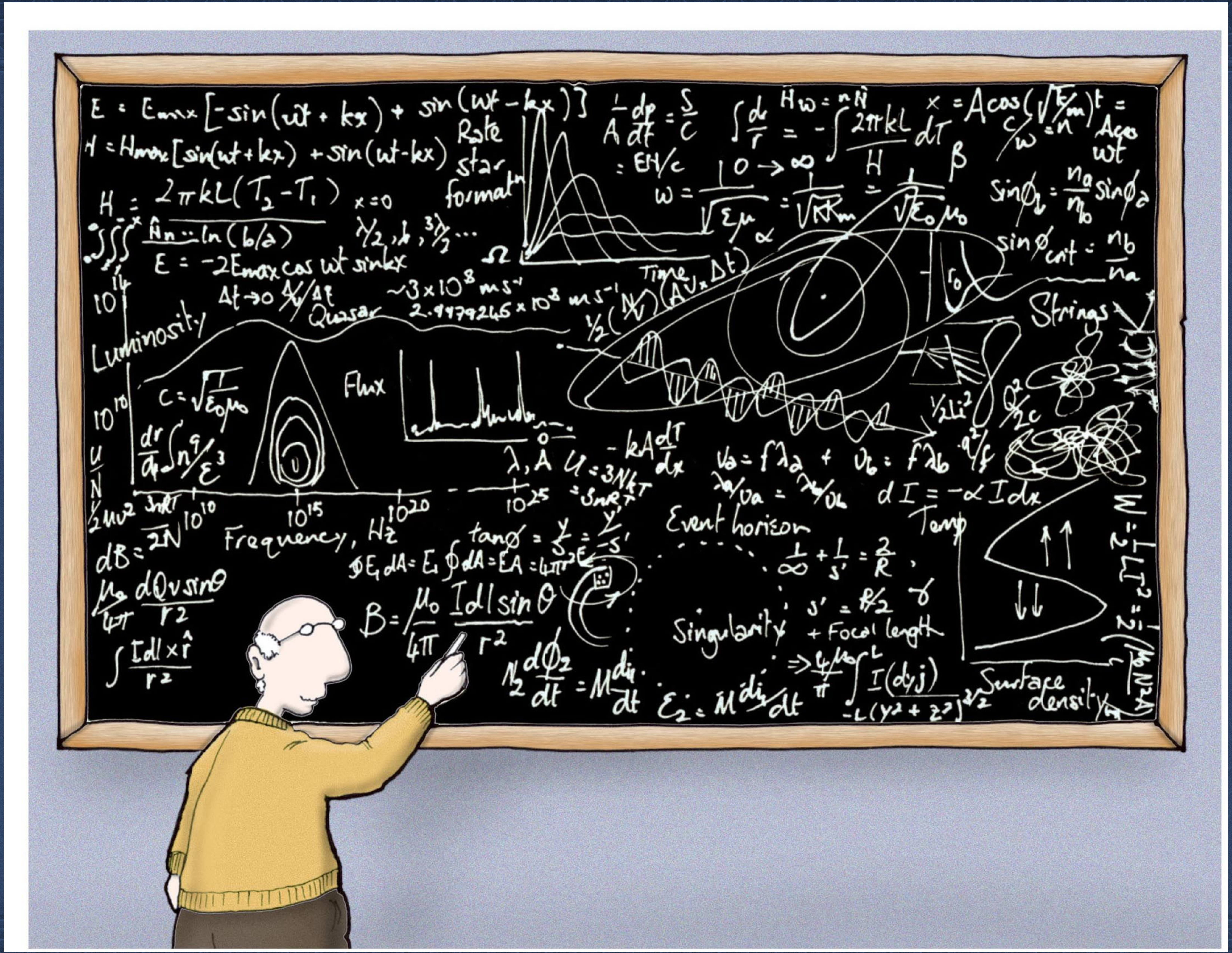
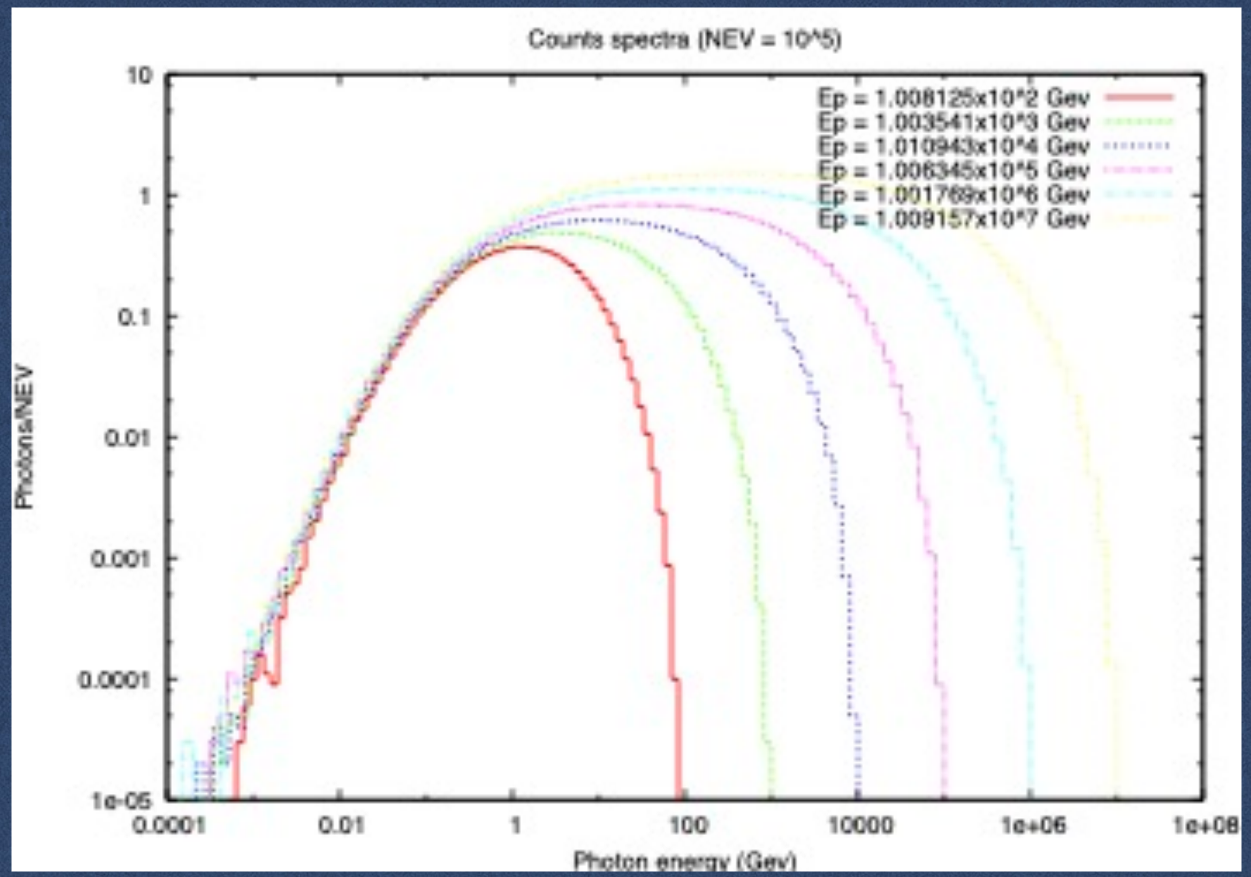
De Vanthier au Centre Galactique

Pascal Chardonnet



GALILEO DESCRIBES HIS DISCOVERIES TO THE CHURCH


Luminosity
Quasar
Flux
Frequency, Hz
Time
Strings
Event horizon
Singularity
Focal length
Temp
Surface density



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THE GAMMA-RAY GALACTIC DIFFUSE RADIATION AND CERENKOV TELESCOPES

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ABSTRACT

By using the PYTHIA version of the Lund Monte Carlo program, we study the photon yield of proton-proton collisions in the energy range between 10 GeV and 1 TeV. The resulting photon spectrum turns out to scale roughly with incident energy. Then, by folding the energy spectrum of cosmic-ray protons with the distribution of H I and CO, the Galactic diffuse emission of γ-rays above 100 GeV is mapped. Prospects for observing that diffuse radiation with atmospheric Cerenkov telescopes are discussed. Present instruments are able to detect the γ-ray glow of the Galactic center. The latter will be mapped by the next generation of telescopes if their energy threshold is decreased. However, a detailed survey of the Galactic ridge will be a real challenge, even in the long term. The MILAGRO project seems more appropriate. Finally, we investigate the γ-ray emission from weakly interacting massive particles clustering at the Galactic center. It has been speculated that those species are a major component of the halo dark matter. We show that their γ-ray signal is swamped in the Galactic diffuse radiation and cannot be observed at TeV energies.

Subject headings: diffuse radiation — Galaxy: center — gamma rays: theory — radiation mechanisms: nonthermal

PLATE 40

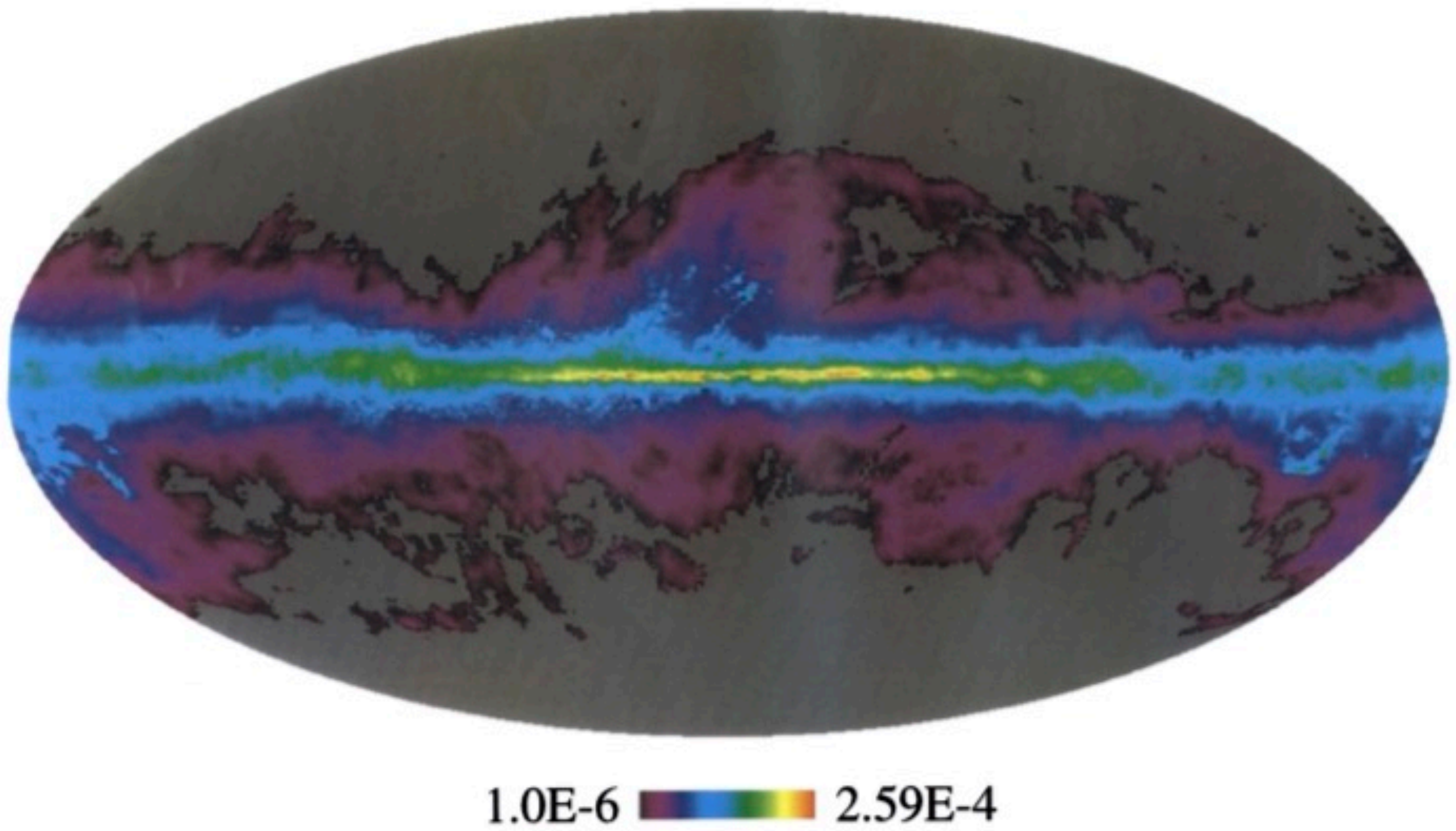

FIG. 5.—Ratio $\Phi_\gamma(> 100\ \mathrm{GeV})/\Phi_p(> 100\ \mathrm{GeV})$ mapped in Galactic coordinates. As discussed in § 2, it varies little with energy. Any value below 10^{-6} has been cut off. The color code is logarithmic. The region delineated by the yellow contour corresponds to a ratio larger than 9×10^{-5} and a fairly strong diffuse emission.

CHARDONNET et al. (see 454, 778)

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PHYSICS LETTER

The 17 keV neutrino in the light of astrophysics and cosmology

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The possible discovery of a 17 keV neutrino in β-decay experiments is a challenge to both astrophysics and cosmology. Should such a species exist, its contribution to the present mass density would play havoc among the heavens unless that neutrino decays with a life-time shorther than 30 000 yr. If so, its radiative decays should neither overcool red giant stars, nor exceed the upper bound set upon the γ-ray flux from supernova 1987A by the Solar Maximum Mission satellite. In addition, radiative decays should not distort the microwave background radiation, whose spectrum is quasi-planckian as observed by COBE. Combining those various arguments, we conclude that the branching ratio B_γ to photons cannot exceed 4×10^{-5}. Such a limit severely constrains the most naive models of the 17 keV neutrino, and points towards unconventional physics.

Grazie Mille Pierre !